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“Enforced” vs. “Casual” Transparency – Findings from IT-supported Financial Advisory Encounters

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In sales-oriented service encounters like financial advice, the client may perceive information and interest asymmetries as a lack of *transparency* regarding the advisor’s activities. In this paper, we will discuss two design iterations of a supportive tabletop application that we built to increase process and information transparency as compared to the traditional pen & paper encounters. While the first iteration’s design was “enforcing” transparency and therefore proved to be a failure [Nussbaumer and Matter 2011], we built the second iteration on design rationales enabling more “casual” transparency. Experimental evaluations show that the redesigned system significantly increases the client’s perceived transparency, her perceived control of the encounter and improves her perceived trustworthiness of and satisfaction with the encounter. With these findings, we contribute to (1) insight into the role of transparency advisory encounter design; (2) design solutions for establishing particular facets of transparency and their potential instantiations in tabletop systems; and (3) insight into the process of designing for transparency with socio-technical artifacts that are emergent as a result of design activities.

1. INTRODUCTION

In sales-oriented service encounters like financial advice, issues of information and interest asymmetry between the client and the advisor are inherent. For Switzerland, e.g., Mogicato et al. [2009] find that advisory quality is hampered by the insufficient comprehensibility of advisory encounters, e.g., related to the performed activities as well as the information used therein. As the advisor may not adequately reveal his line of reasoning, the relation between the client’s financial situation and needs and the advisor’s solutions is not easily comprehensible. This might also affect the client’s clarity of her role, being unsure of how to interact with the advisor and influence the solution. Being strained by such information asymmetries (the advisor being more knowledgeable than the client) and potential interest asymmetries (the advisor possibly exploiting information asymmetry to take advantage of his client), the advisory encounters are typically characterized as rather untrustworthy and unsatisfying [Oehler and Kohlert 2009; Mogicato et al. 2009; Nussbaumer et al. 2011].

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In this paper, we suggest that such issues can be addressed by improving *transparency* between client and advisor. Conceptions of transparency have been discussed in different domains of research; they overlap, however, in stressing that the degree of transparency – i.e., the degree of "seeing through" something – is tightly related to the information that is available to the observer [Eggert and Helm 2003; Hultman and Axelsson 2007]. Based on this notion of transparency, we will present how we developed two prototypical iterations of a tabletop application to increase transparency of advisory encounters as compared to their traditional pen & paper counterparts.

In our first design iteration [Nussbaumer and Matter 2011], we used the concept of representational guidance [Suthers and Hundhausen 2003] to "enforce" a transparent depiction of the process activities between client and advisor – in experimental evaluations with 4 advisors and 12 clients, however, we found that the system did not improve the client-advisor encounter as compared to the traditional situation, as it disturbed the actors' interaction and conflicted with their expectations. Thus, for the second iteration, we fundamentally revised our design rationales towards a more "casual" appeal of transparency, inspired by Shneiderman's information seeking mantra [Shneiderman 1996]. Experimental evaluations with 12 advisors and 24 clients showed that, this time, using the system clearly outperformed the traditional situation, significantly improving the clients' perceived transparency and control, their perception of the advisors' trustworthiness as well as their overall satisfaction.

With these findings, we offer three contributions; (1) we provide insight into the role of transparency as a critical element in client-advisor encounter design; (2) we present design solutions for establishing transparency regarding the advisory process and its information and their particular instantiations for tabletop systems; (3) we provide insight into the process of eliciting and fulfilling requirements of transparency with socio-technical artifacts that are initially unknown but emergent as a result of design activities.

2. ISSUES IN FINANCIAL ADVISORY ENCOUNTERS AND THE ROLE OF TRANSPARENCY

Research has repeatedly pointed to the poor quality of financial advisory services [Oehler and Kohlert 2009; Jansen et al. 2008; Mogicato et al. 2009], relating to an inherent asymmetry of information and interests as suggested by agency theory [Golec 1992]. Information asymmetry results from the client being generally less knowledgeable than the advisor – she cannot be sure whether the advisor actually gathers and provides all relevant information and recommends appropriate solutions for her financial needs. Advisors might exploit this information asymmetry by, e.g., superficial information gathering and provision, or even worse, recommending products that are unsuitable for the client's needs but profitable in terms of fees. Oehler & Kohlert [2009] argue that such information and interest asymmetries *must* lead to poor advisory quality.

Correspondingly, clients are not very confident that advisors present adequate solutions to their needs and find them rather untrustworthy [Nussbaumer et al. 2011].

2.1 Characteristics of Financial Advisory Encounters

Based on the asymmetries in client-advisor encounters, we find the root cause of poor quality in two main characteristics that so far have not been sufficiently addressed in the provision of advice [Schmidt-Rauch and Nussbaumer 2011].

First, financial investment consultations are encounters of experts (advisor) and laypersons (client). Thus, as compared to the advisor, the client has less knowledge about the solutions to her problem or the process of finding them, also constraining the clarity of her role (or task) within the encounter. Consequently, clients tend to perceive their advisor as "black box" [Mogicato et al. 2009:29; Oehler and Kohlert 2009:93], feeling that their interaction with the advisor is rather unpredictable, e.g., regarding the information provided by the client and how they influence the advisor's solution. The expert-layperson relationship is further impaired by the poor information exchange within the service encounter [Oehler and Kohlert 2009], where the client has to rely on product brochures and the advisor's explanations, which he will eagerly sketch on a sheet of paper. In addition, such information provision tends to be static and to not consider the client's particular range of knowledge and preferences; indeed, advisors tend to broadly categorize clients and their problems – they provide information and select the best option associated with the category rather than evaluating the complete set of options [Jungermann and Fischer 2005:160; Jungermann 1999:5] and thereby fail to provide information and solutions relevant to the particular client's needs.

The second characteristic can be found in the implicit presupposition of a joint problem-solving process. In general, the solution to the client's problem may not be accomplished without inputs of both client (information about her needs and preferences) and advisor (explanations and recommendations). As such, any solution must be co-created on the basis of advisor-client interaction [Schmidt-Rauch and Nussbaumer 2011]. However, such co-creation is hindered by the lack of common ground – the client is hindered to participate and co-create because she might not be sure when or where to take influence in the process and its solution.

In this paper, we break down these issues into two main problems that might be addressed with introducing transparency – (a) absence of appropriate information provision: in the current situation, the client may not easily monitor and verify the encounter's progression and results. (b) Lack of client interaction: partly as a result of poor information provision, the client is hindered to take influence on the advisory encounter and is thereby impeded in individualizing the solution to her financial needs.

2.2 Transparency in Financial Advisory Encounters

The concept of transparency has been discussed in relation to the availability of information to actors in business relationships. Eggert and Helm apply their concept of transparency on business relationships as “an individual’s subjective perception of being informed about the relevant actions and properties of the other party in the interaction” [Eggert and Helm 2003:101]. The characteristic of “being informed” also applies to the notion of transparency discussed in financial literature, where decision makers are found to have a preference for transparency [Andersson and Holm 1998] – such a conception has also been prominently discussed as “ambiguity aversion” in behavioral finance literature [Camerer and Weber 1992].

For buyer-supplier relationships, Hultman and Axelsson [2007] suggest four types of transparency (regarding costs, supply, organization and technology), each of which may vary in their degree of presence, their direction as well as their distribution. However, it might be the combination of information as a whole that forms the client’s perception of transparency, leading them to “interpret situations as lacking transparency when the service representative’s actions are hidden from them, or when they sense that information is being withheld” [Inbar and Tractinsky 2011:7].

In research on Computer Supported Cooperative Work (CSCW) and Computer Supported Collaborative Learning (CSCL), aspects of transparency have been discussed regarding the enhancement of organizing communication processes, i.e., supporting users in interpreting procedures and evaluating their rationales and implications. In group work, for example, the underlying communication and cooperation processes are not always explicitly defined – this lack of transparency may lead to coordination problems when the status of the group work relative to the overall process is not known [Kienle 2006]. Focusing on the allocation of tasks between a user and an IT system and the according information provision of the system, Grote et al. [1999] use the notion of transparency to describe the degree a user is enabled to see through and foresee the work process.

Looking at the different perspectives and definitions of transparency, we find a commonality in their notion of information being provided or being withheld – the degree of transparency thereby depends on the information available to the respective observer. The question of *what* information to provide to establish transparency, however, seems to be highly context-specific – while, for example, in supplier-buyer relationships cost and supply information might be most important, in cooperative team work transparency might relate to explicit definitions of communication processes.

Based on our discussion above, we argue that client-advisor interactions in financial advisory services should account for transparency regarding the *process* and the *information* used therein. We define *process transparency* as the comprehensibility of the advisory process, i.e., the “degree of the client being able to follow and comprehend the performed activities (*what* constitutes an activity and *why* is it performed) and their succession [i.e., their sequence] in advisory" [Nussbaumer and Matter 2011:4; note from the authors]. As suggested previously, information provision should thereby enable the client to monitor and verify the advisor's actions.

In contrast, we define *information transparency* as being related to the available information space, where information *is used from* and *contributed to* by both the advisor and the client. Regarding the former, information transparency can be defined as the degree of the client being enabled to monitor and comprehend the information used as the basis of decision making and to assess their quality and suitability [Nussbaumer and Schwabe 2010]. From the perspective of contributing to the information space, information transparency may also refer to the degree of the client being able to comprehend what information is gathered for what purpose and with what effect [Awad and Krishnan 2006]. In this paper, we will focus on this facet of information transparency.

3. DESIGN REQUIREMENTS

Summarizing the discussion above, we argue that there are two basic design principles in improving existing issues of client-advisor encounters: (a) establishing process and information transparency and (b) allowing the client to better control and influence the advisory process and its results.

In line with the propositions of Inbar and Tractinsky [2011], we suggest that these enablers may be best addressed by provision of an IT system offering shared information spaces.

An intuitive approach to information sharing in IT systems is the provision of shared screens as "informational resources" that client and agent can refer to and make sense of [Rodden et al. 2003]. These shared information spaces allow the client to monitor the advisor's actions and intervene, if necessary. Thus, we pose the provision of shared information spaces as our first design requirement (DR):

DR1. *Provide transparent information access for both parties with shared information spaces, permitting both actors to observe each other's actions at any time.*

In addressing current issues of advisory encounters, we have suggested to improve client-advisor interaction by enabling process and information transparency. Increased transparency has been proposed to also positively influence trust and satisfaction [Inbar and Tractinsky 2011].

DR2. *Provide visualizations of activities and their relationships to increase process transparency and to enable the client to comprehend the performed activities and their succession.*

DR3. *Show visualizations of the information provided by the client and give feedback regarding which information is needed for what purpose and with what effect.*

Shared and transparent information spaces should also account for improved client influence and control. In line with Inbar and Tractinsky [2011], we suggest that increased control may also positively influence overall client satisfaction.

DR4. *Enable the client to actively interact with the system and the advisor and provide means for her to control and influence the advisory process and its results.*

The shared information resources should not constrict the advisor in adapting the advisory process to the specific client. This is especially important as advisors disapprove rigid process guidelines, which organizations introduce to standardize advisory activities [Mogicato et al. 2009]. Thus, the system should provide decisional guidance for its users, suggesting an appropriate course of actions, but not restrict users to comply with the suggested process or to limit users to a set of possible actions [Silver 2006].

DR5. *Allow actors to customize the advisory course, while suggesting an appropriate advisory process.*

In the following, we will discuss two design iterations of how we implemented these requirements, following the design rationales of “enforced” transparency for the first and “casual” transparency for our second implementation. We thereby aim to contribute to a better understanding of design rationales enabling transparency and how to implement them in shared IT artifacts. Though several studies have been concerned with improving client-advisor interactions with shared IT artifacts [Novak and Schmidt 2009; Rodden et al. 2003; Schmidt-Rauch and Schwabe 2011], we find little empirical accounts regarding the influence of transparency on such interactions. To contribute to an empirically grounded understanding of such effects, we will also accompany the designs with results from experimental evaluations.

4. THE FIRST ITERATION: “ENFORCED” TRANSPARENCY

The detailed design of this iteration has been reported in Nussbaumer and Matter [2011], whereas in the following we will focus on the general design rationales.

As to enable shared information and activity spaces that allow interaction of advisors and clients (DR1, DR4) without explicit handovers, we implemented the prototype application for a multi-touch tabletop device (Microsoft Surface). Figure 1 gives an impression of how the shared information space integrates into the advisory encounter.

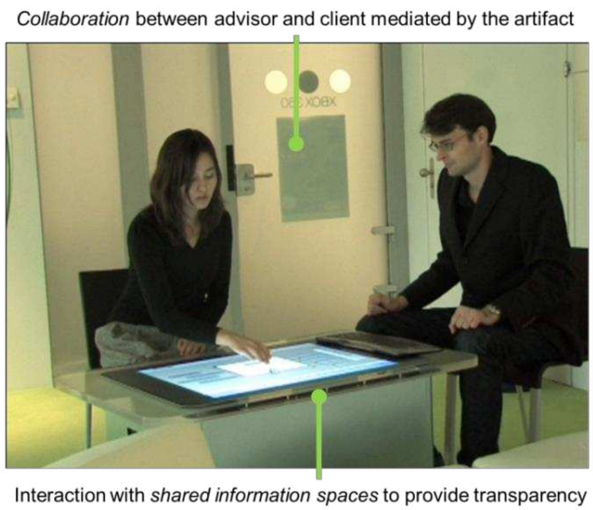

Fig. 1. Interaction with the tabletop system

We built the front-end design of our application, i.e., the instantiation of the shared information and activity space, upon the basic rationale of decisional guidance [Silver 2006; Silver 1991] to direct users through a suggested advisory process. For visualizing the respective process of activities, we relied on the principle of "representational guidance" [Suthers and Hundhausen 2003]. Thereby, we provide a "map" of the advisory process as a diagram that may be monitored and controlled by both the advisor and the client (Figure 2).

Such representations have been used, for example, in CSCL research to provide basic means of orientation and support cooperative process enactment, which should lead to increased knowledge exchange and integration [Carell et al. 2005]. To make the advisory process and its activities transparent and supposedly more comprehensible (DR2), we decided to make it an anchor point of the application's information and interaction design.

Being always visible on top of the shared information space, we used the map as a means of navigation through the different advisory activities, to emphasize on their interrelations and to suggest an appropriate advisory process – the depiction, however, did not enforce or restrict users to a specific order but allowed for different starting points and revisiting activities (DR5). The map enabled the client to monitor the progression of the encounter, while it restrained the advisor from obviously skipping important activities (e.g., risk analysis). For each activity, we provided a separate interactive information space, each allowing exploration of the effects of entered (client) information (DR3). Figure 2, e.g., shows the visualization and interaction possibilities of defining an asset strategy while accounting for the risk/return trade-off.

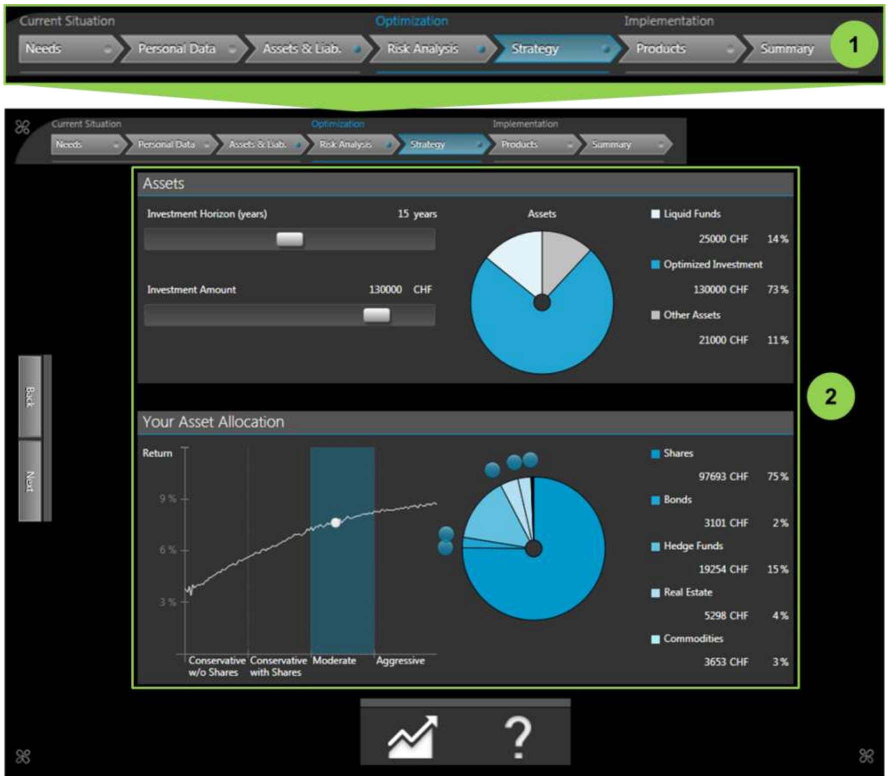

Fig. 2. Design of the first prototype; (1) Navigable process map,
(2) shared information/activity space

We experimentally evaluated the system in a lab study with 4 advisors and 12 clients, comparing their valuations of using the system versus performing a traditional pen & paper consultation. The within-subjects test design was analogous to the second iteration, which will be discussed below (a detailed account on the first iteration's evaluation design and results can be found in Nussbaumer and Matter [2011]).

Looking at the evaluation results, it became clear that the design had failed to achieve our design goals – the system did not increase the perceived transparency (measured as the perceived comprehensibility of the order of activities and their results), controllability (measured as the client's perceived influence on the process and the her perceived degree of the process enabling her to participate) or the overall satisfaction of the client (measured using items of the Yield Shift Theory of Satisfaction [Briggs et al. 2008]). Regarding their perceived ability to influence the solution finding process, clients even rated the traditional encounter significantly higher. Table I below provides the detailed results [Nussbaumer and Matter 2011].

What had happened? Indeed, advisors and clients found that the application was helpful in supporting them with dynamic visualizations. Also, their ratings regarding process transparency was comparable to the traditional situation. However, visualizing the process map as an anchor point of the application, led to a perception of the system "enforcing" this process and constricting it to the depicted activities. Thereby, what was intended as a means of suggestive decisional guidance [Silver 2006] was perceived by users as restricting their possible actions. Furthermore, visualizing one activity at a time and implying interrelations only through the process depiction, failed to enhance the client's comprehensibility.

Table I: First iteration evaluation results [Nussbaumer and Matter 2011]; all measures rated on a 7-point Likert scale

Measure	*Avg. rating for traditional setting*	*Avg. rating for IT-supported setting*	*Dependent t-test (two-sided)*
Perceived comprehensibility of process activity order	5.08	5.00	Not significant
Perceived comprehensibility of results	5.42	4.58	Not significant
Perceived influence on solution finding process	5.50	4.00	$t(11) = 2.691$, $p = .021$
Perceived enablement to participate	5.17	4.50	Not significant
Overall satisfaction	5.37	4.90	Not significant

In summary, our design of supporting client-advisor interaction and making its progression more transparent was actually perceived as disturbing control and conversation:

Perceived constrained control: Advisors experienced the system as being authoritative, feeling obliged to use the application's functionalities in the exact order of the depicted process, thereby also restricting interaction with the client to the set of supported activities. Along the same line, clients felt that the process was deterministic regarding the course of action and coverage of content and activities. For them, the system seemed to confine their problem space to the type of problems the system could tackle, concluding that *what they saw was all they could get.*

Interruption of conversation: The cooperative system with its shared information spaces shifted both actors' attention from interpersonal communication to operating the system. Feeling obliged to the consultation process depicted by the system, the advisors experienced difficulties in dissolving from the system and maintaining face-to-face communication.

5. THE SECOND ITERATION: "CASUAL" TRANSPARENCY

As the user feedbacks of our first iteration indicate, the design rationale of representational guidance was conflicting with both the advisor's and the client's conceptions the advisory encounter. Still striving to increase the transparency of client-advisor encounters with shared information spaces, we decided to keep our initial design requirements but to adapt and amend them. As the design of the first prototype was perceived as constraining the users' control regarding the advisory session's progression, we adapt DR5 as follows:

DR5. *Allow actors to customize the course of advising without visualizing or implying a specific process.*

Also, the artifact tended to shift focus from interpersonal communication to interaction with the system. While focus on the system may bridge otherwise socially awkward situations between advisors and clients [Rodden et al. 2003], we found that the actors perceived the lack of face-to-face communication as a disturbance. We therefore pose the following additional design requirement for a supportive IT artifact:

DR6. *Enable social use of the system incorporating traditional face-to-face communication and prevent interruption of communication caused by undue focus on the artifact.*

5.1 The Second Prototype Application

We find the main cause of our first design's failure in its rigid process depiction that "enforced" transparency on the users while restricting their actions. Thus, in the second design iteration we aimed at providing a more "casual" transparency design, which was inspired by Shneiderman's "visual information seeking mantra" [Shneiderman 1996]. The "mantra" suggests using the tasks of "overview first", "zoom and filter" and "details on demand" as a starting point for the design of graphical user interfaces. Implicitly using these tasks as basic metaphors for visualization and navigation, we introduced the following changes to the system design.

From representation of activities to informative guidance: Analogous to our first iteration, we implemented the second prototype application for the Microsoft Surface tabletop device, providing the same interaction scenario as depicted in Figure 1. However, we fundamentally revised the design from the first iteration's *explicit* towards a more *implicit* process communication. Thereby, we aimed at better emphasizing the system's non-restrictiveness in the design, providing less directive, *informative* guidance that informs the actors' judgments without explicitly suggesting how to act [Silver 2006:94].

The most evident change relates to the abandonment of the process representation (Figure 3). Instead, we address DR1 and DR2 by visualizing the shared information space with different levels of overview. In place of representational guidance regarding the supported activities (e.g., gathering personal information, needs analysis, risk profiling), we emphasize the relevant information blocks of advising (e.g., personal information, needs, risk tolerance). Each information block may be "zoomed" in to allow more detailed levels of discussion. Basically, the application thereby provides three levels of discussion that differ in their degree of detail and complexity.

The first and most abstract level contains a generic depiction of the advisory process (not shown in Figure 3) – this level provides a common entry point to advising and may be used to explain the general advisory approach and its relevant activities. The second and main level of the application provides an overview of information relevant for investment advice (e.g., regarding the client's cash flow, existing assets or risk tolerance; cf. Figure 3a), whereas each information block is depicted as a "widget" around a central visualization of the projected assets growth. The third level of discussion is provided by the "detail view" of each information block (Figure 3b). While the second level (widget overview) may be used to quickly add or change aggregated information, the detail view allows for an accurate investigation, e.g., to uncover inadequacies or missing information. Similar to the second level, changes or additions in the detail view will have immediate effects on the central visualization of the projected assets growth.

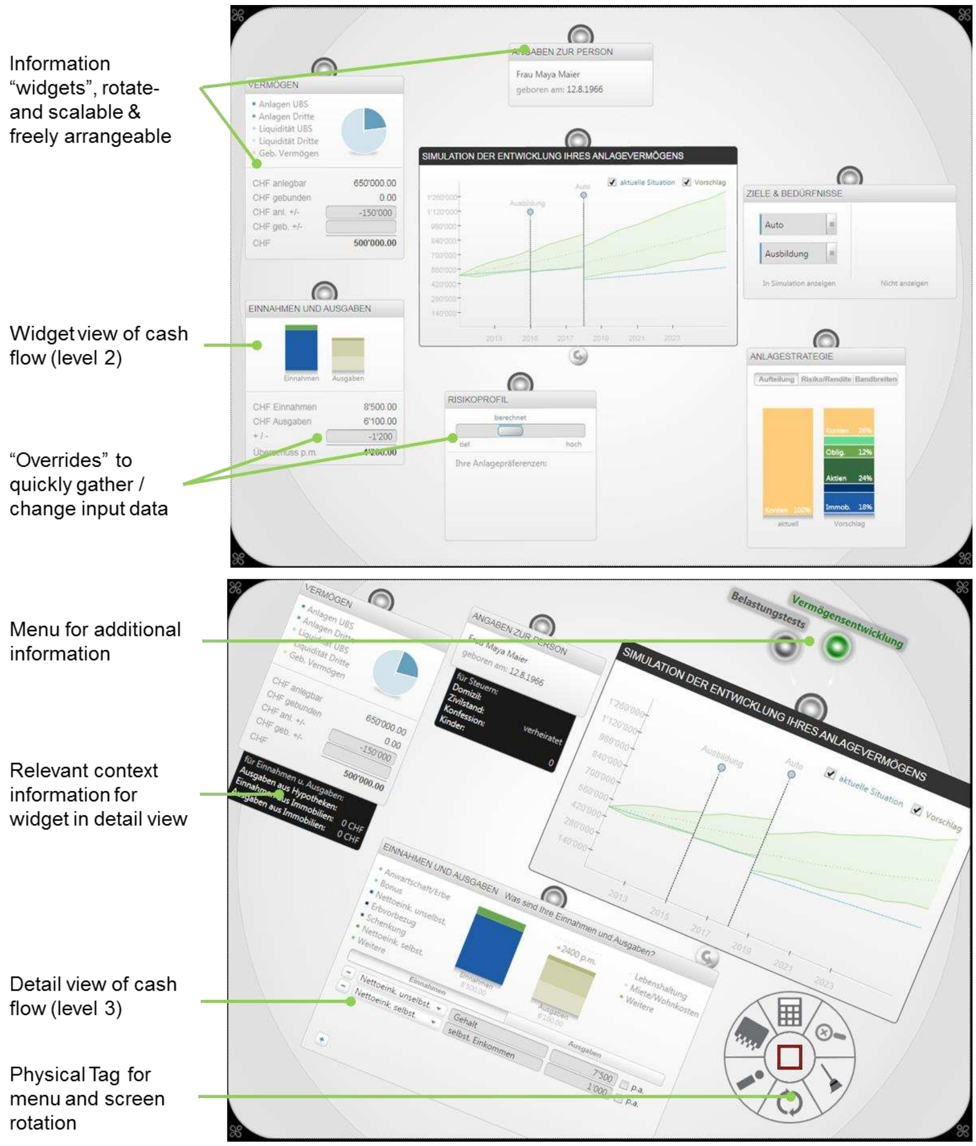

Fig. 3. Design of the second prototype; upper screen (a) widget overview; lower screen (b) detail view of cash flow with other activity widgets providing relevant context information

From progress by activity to progress by information: In opposition to our first design, displaying information blocks should not imply any restriction on the available activities to operate on them. Such a presentation should also avert the user's perception of an explicit process order. Rather than guiding them through a series of activities, the revised design provides indications of which information blocks the users should attend to. Changes of the risk preference, for example, might affect the investment strategy – if so, the application will notify the users that the strategy does not conform to the adjusted risk, thereby suggesting that the users should attend to adapting the configured strategy. While still addressing DR2 and DR3, such an implementation enables transparency in a more casual and less enforced manner. To further enable adaptability in advisory progression (DR5), we introduced the principle of "overrides". In the second level view, the widgets' aggregated values may be "overruled" at any time, i.e., the calculated values (from the third level, detail view) may be changed to quickly simulate different scenarios or to express uncertainty (e.g., if no exact figures can be provided for existing assets or cash flow, the estimated aggregated values may be used as the basis of other widgets). Thereby, the application also allows quickly accessing specific information (widgets), while implying no specific order of progression and minimizing initial efforts of data entry.

From single focus to adaptable focus: Our first design only visualized information that was assigned to the displayed activity. The design thereby concealed other information as well as their possible interrelations. The "overview" design of the second iteration, however, allows for an unobtrusive way of showing such relations. Changing the aggregated value of the cash flow (depicted on the lower left of Figure 3a), for example, will have immediate visible effects on the central visualization, changing the projected growth of the client's assets; analogously, adding a financial need or goal in the respective widget (located next to the central visualization in Figure 3a) will immediately add and contextualize it to the projection of the client's assets.

As depicted in Figure 3b, accessing the detail view of an information block causes other blocks (widgets) to display relevant context information, thereby further addressing DR3. For example, when advisor and client discuss the details of the client's cash flow, relevant information from widget "assets" (e.g., mortgage payments affecting the cash flow) and "personal information" (e.g., marital status and domicile, which will affect the cash flow in terms of taxation) are shown – in this way, the actors are provided with the relations between information blocks and may quickly assert whether all important information are available and/or correct. Focus might further be adapted by increasing the size of information blocks as to emphasize on specific information, "stacking" information items that are currently not needed or even "pushing" them to the screen's margin to take them out of sight.

From advisor-system to client-advisor interaction: Analogous to our first design and other than suggested by Scott et al. [2003], we implemented the shared information spaces (DR1) as "public only", i.e., featuring no private or semi-public spaces for the advisor, so the client may observe any of the advisor's actions and may interrupt/intervene to correct. Thereby only supporting the "joint" activities of client and advisor, we argue that providing private information spaces not observable by the client could weaken transparency (DR2 and DR3) and enable the advisor to conceal information. To allow for note-taking during face-to-face communication without using the system (e.g., during the initial small talk), however, advisors are supplied with a physical notepad providing a temporary, semi-public work space.

As to better enable the client to monitor the advisor's actions and motivate her to interact with the system (DR4), all information items are by default oriented to the client. This should positively influence the client's affordance of interpreting the visualizations and interaction possibilities, which has been shown to be affected by the viewing position [Wigdor et al. 2007]. To allow for different seating positions, however, the actors may rotate the panel or rotate and scale each widget individually. This dynamic orientation of information items allows for strong communicative gestures [Kruger et al. 2004]. The free arrangement of all widgets (including the central visualization) further enables adaptability as demanded by DR5, supporting different work styles and enabling the creation and maintenance of basic mental models [Isenberg and Carpendale 2007:1234], which might be unique to the individual pair of advisor and client.

Regarding the social use of the system (DR6), our design of a shared, transparent and adaptable information space should better support face-to-face communication by reducing "representational asymmetry" [Rodden et al. 2003:59] and thereby "preserve the salience of important social-interactional cues like attention, gaze and gesture" [Halloran 2002:29]. To additionally enable the advisor in emphasizing such interactional cues, we introduced a physical token. This token may be placed anywhere on the screen to display a radial menu, allowing to change levels of discussion (level 1 to levels 2/3), select general tools (e.g., calculator, notebook or additional information sources) or rotate the screen. Using the gesture of placing the token on the tabletop allows the advisor to more explicitly orchestrate changes of focus, e.g., shifting levels of discussion, or changing the perspective from dynamically manipulating information to browsing additional informational resources.

To further strengthen the client-advisor interaction and communication, we also provide the advisor with an explicit gesture of "deactivating" the tabletop application; when putting his physical notepad (or any sheet of paper) on the tabletop screen, the screen grays out and is locked, i.e., prohibiting interaction with the displayed information. Also, in the training sessions, we provided the advisors with "best practices" of how to prevent too much focus on the artifact or how to shift the client's attention from monitoring the artifact to facing the advisor. We found, for example, the advisor simply leaning back in his chair a strong communicative gesture to attract such client attention.

6. EXPERIMENTAL EVALUATION

We based the evaluation on the following conjectures regarding the application's influence on the client's perception of the advisory encounter. One of the main design goals was to enable the client to follow and comprehend the advisory process and its activities. The according conjecture reads as follows:

C1: *Provision of the artifact with shared information and interaction spaces will improve the perceived process transparency as compared to the traditional financial advisory encounter.*

Additionally, our design aims at providing information transparency as to enable comprehension of what information are gathered for what purpose and with what effect:

C2: *Provision of the artifact with shared information and interaction spaces will improve the perceived information transparency as compared to the traditional financial advisory encounter.*

Enabling the client to better comprehend the advisory process and its activities and providing shared interaction spaces, we assume the client's perceived controllability to increase:

C3: *Provision of the artifact with shared information and interaction spaces will increase the client's perceived controllability as compared to the traditional financial advisory encounter.*

Clients are inherently dissatisfied with financial advisory services [Mogicato et al. 2009]. Having identified lack of transparency and control as a possible cause, we suggest that the provision of our prototype system will increase client satisfaction:

C4: *Provision of the artifact with shared information and interaction spaces will increase the overall client satisfaction as compared to the traditional financial advisory encounter.*

Finally, it has been suggested that transparency might be positively associated with the client's perception of trustworthiness [Inbar and Tractinsky 2011]. We therefore conjecture that using the system will positively influence perceived trustworthiness:

C5: *Provision of the artifact with shared information and interaction spaces will increase the client's perceived trustworthiness of the advisor as compared to the traditional financial advisory encounter.*

6.1 Experimental Design

Our experimental evaluation involved 24 clients and 12 advisors in a within-subject design to compare the IT-supported encounter with its traditional counterpart (pen & paper). We recruited the client participants by convenience sampling through postings on a university forum – thus, 14 of the 24 participants were university students. Each client participant received 50 CHF (approx. 64 USD). The consultations were conducted by advisors of a Swiss bank. Table II summarizes the participants' profile.

Table II. Profile of participants

	Clients	Advisors
Age	20-52 years (*M* = 28.04, *SD* = 9.12)	27-55 years (*M* = 38.00, *SD* = 8.55)
Sex	12 female / 12 male	2 female / 10 male
Experience	9 experienced with financial advice	2-30 years (*M* = 11.58; *SD* = 8.20)

Clients received a short introduction of 15min before the tests, including instructions about their tasks and their assumed financial profile. Their main task was to get advice for the investment of a specific amount of money (ranging from 200’000 CHF to 250’000 CHF or 250’000 USD to 320’000 USD, respectively), while considering a financial need (e.g., purchasing a car or an apartment). Each client participated in two advisory situations, one corresponding to the traditional (pen & paper) advisory service typically provided in Swiss banks, the other involving the tabletop application. To counterbalance confounding effects of the order of settings, we randomly assigned half of the clients to start with the traditional and the other half to start with the IT-supported situation. Each test session was limited to 45min.

Advisors received an introduction to the application 2-3 days in advance (60min) as well as a hands-on training of 90min on the day of the experimental evaluation, including best practices of how to use the artifact with clients. In the traditional setting, their task involved to advise clients along their actual practice (they were asked to bring all material needed to advise a client in a setting as described above). For the IT-supported session, they were asked to use the prototype application to advise the client, whereas they were required to use it at least once. Each advisor performed two traditional and two IT-supported sessions. Thereby, a pair of advisors was assigned to four clients, which by turns were advised by one of the advisors in either the traditional or the IT-supported setting. In this way, we were able to counterbalance possible effects of the advisor’s varying performance.

6.2 Data Collection

The evaluation was performed on six days in May 2011. After their trials, client and advisor participants received a questionnaire and were debriefed in semi-structured interviews. To evaluate our client-related conjectures, in this paper we will focus on the results of the client questionnaire and the client interviews. In addition to items for evaluating our conjectures, the questionnaire also included demographic items (age, gender, education, advisory experience, IT proficiency).

We operationalized the conjectures' dependent variables as follows. *Process transparency* was measured as the user's ability to see through the goals and realization of activities as well as to foresee the process (in terms of knowing when and how to interact) [Grote et al. 1999:145]. In addition, we measured the client's comprehensibility regarding procedure and results using self-constructed items. *Information transparency* was measured according to the client's subjective comprehension of which information was gathered and to what avail [Awad and Krishnan 2006].

The client's *perceived controllability* of the two settings was investigated with self-constructed items that were based on the notions of information authority (control of information use) and process authority (control of the advisory course) presented in Grote et al. [1999]. To measure *satisfaction* with the advisory settings, we used items suggested by the Yield Shift Theory of Satisfaction of Briggs et al. [2008].

Finally, *perceived trustworthiness* was measured using items from Bhattacherjee [2002], adding items on competence from Cheung and Lee [2000] and integrity from Gefen [2002]. Each item was measured once for each advisory setting using a seven-point Likert-scale (ranging from 1 = "I strongly disagree" to 7 = "I strongly agree").

6.3 Results

We will present the results in the order of our conjectures. Differences in ratings of the traditional and the IT-supported setting were tested with two-sided t-tests for paired samples with differing variances. The clients' average ratings as well as the results of the t-tests are summarized in Table III.

Table III: Evaluation results of second iteration; all measures rated on a 7-point Likert scale

Measure	*Avg. rating for traditional setting*	*Avg. rating for IT-supported setting*	*Dependent t-test (two-sided)*
Perceived process transparency	5.30	6.05	$t(23) = 2.828$, $p = .010$
Perceived information transparency	5.45	6.42	$t(23) = 3.781$, $p < .001$
Perceived controllability	4.83	5.94	$t(22) = 3.553$, $p = .002$
Perceived trustworthiness	6.07	6.46	$t(23) = 2.494$, $p = .020$
Overall satisfaction	5.16	6.32	$t(23) = 3.564$, $p = .002$

As conjectured, the clients' perceived process transparency and information transparency were rated significantly higher for the IT-supported setting, in which the artifact with shared information spaces was provided. Hence, our data support conjectures C1 and C2. Three clients pointed out that the artifact as a shared information space was a key factor to them regarding the comprehensibility of performed activities and the advisory outcome. Two clients commented that without the artifact, the use of gathered information remained unclear to them. Another two clients mentioned that, using the shared artifact, the advisor seemed to ask additional questions that had been left out in the traditional setting (e.g., regarding third party assets).

Furthermore, our client participants perceived controllability significantly higher in the IT-supported setting as compared to the traditional setting. Thus, conjecture C3 is supported by our data as well. The clients' quantitative assessment of controllability was mirrored in the semi-structured interviews, where they clearly preferred the IT-supported setting. For the traditional setting, one client even had the impression that the advisor was following a hidden agenda on which she had no influence.

The average rating of the clients' overall satisfaction was significantly higher in the setting provided with the IT artifact and thereby supports conjecture C4. Due to our within-subject test design, we can eliminate the argument that some advisors generally outperformed other advisors. Clients that preferred the IT-supported advisory setting brought forward the following reasons: better comprehensibility, better overview, innovativeness and "fun". However, the two clients who preferred the traditional advisory setting argued that they were granted more speaking time, making the encounter more trustworthy and pleasant.

As supposed in conjecture C5, the clients' average rating of their perception of the advisors' trustworthiness was significantly higher for the advisor using the artifact. Thus, our data also supports conjecture C5. Interestingly, ten clients pointed out that trustworthiness was depending on the advisor's character and personality rather than the provision of IT support. On grounds of our balanced test design, however, these results indicate that the provision of the supportive system indeed contributed to the clients' perceived trustworthiness of the advisor. In the interviews, only five clients said that they found the advisor using IT more trustworthy, while one client even remarked that he had more confidence in the provided technology than the advisor. This line of argument is supported by three other clients, who felt the IT-supported setting to be more trustworthy because the system "cannot lie".

7. DISCUSSION

With our research, we strive to offer three contributions; (1) to provide insight into the role of transparency as a critical element in client-advisor encounter design; (2) to present design solutions for establishing transparency regarding the advisory process and its information as well as their particular instantiations for tabletop systems; (3) to provide insight into the process of eliciting and fulfilling requirements of transparency with socio-technical artifacts that are initially unknown but emergent as a result of design activities.

The *first contribution* relates to our learning about transparency as a critical element in client-advisor encounters. In this paper, we have introduced transparency as a means to address existing asymmetries in client-advisor encounters and, thereby, as a basic enabler of collaboration to support joint problem-solving and co-creation of solutions. In particular, we have suggested improving process transparency and information transparency to increase the clients' comprehension of the advisory encounter and to thereby also increase her control of the process and its results.

Indeed, as our experimental results have shown, increased transparency did not only positively affect the client's perception of the advisory encounter but also improved client-advisor interaction therein. Similar to what has been reported by Halloran [2002], we found that shared information spaces may improve the quality of discourse, enabling more detailed and stimulating discussions between advisors and clients as compared to the traditional situation. We ascribe this to the richer decision base that provided the actors with detailed and dynamic contextual information.

Regarding perceived trustworthiness, we find that clients perceived advisors as being very trustworthy in both the IT-supported and the traditional situation (the latter being in strong contrast to client surveys on their perception of advisory services, e.g., Nussbaumer et al. [2011]). However, even though clients explicitly commented that the perceived trustworthiness was dependent from the advisor's personality and character, we find that supporting the situation with the shared artifact indeed contributed to an improved client perception of advisor trustworthiness.

Overall, our evaluation results indicate that transparency might indeed be a critical element for the design of client-advisor encounters and their IT support. However, its potential effects on user comprehension, control and satisfaction should warrant consideration of transparency for other types of socio-technical systems, specifically in asymmetric scenarios. Our findings thereby might also be of value in designs that support other types of collaboration, e.g., mentoring, teaching or other domains of sales-based consultation (travel counseling, insurance consultancy).

The *second contribution* of our research relates to the specific design solutions for improving transparency with shared tabletop systems. In this paper, we have demonstrated how we detected problems with specific transparency designs and how we revised them to address emerging issues. Fundamentally revising the design's basic rationale from "enforced" (first iteration) to "casual" transparency (second iteration) greatly influenced the clients' perception of the advisory encounter. The more "casual" design of transparency enabled the clients to better comprehend the process, its information base, its activities and their interrelations. Thereby, with the revised design of the second iteration, we were able to significantly improve the client's assessment of the IT-supported encounter as compared to the traditional situation, even though this situation was also rated very well. Considering that 150mins of advisor training in using the system had to compete with up to 30 years of advisor experience in the traditional setting, the significantly improved ratings are even more striking.

The revised design also significantly improved the clients' perceived controllability. We ascribe this to the transparent information sharing, which enabled client and advisor to discuss on common ground – from observations we found that clients and advisors often used gestures to reference on the shared representations. Controllability may also have been influenced by the revised design better enabling clients to directly interact, with 19 of 24 clients in the second evaluation directly manipulating the system (doing so, however, only on the advisor's request).

In contrast to our first evaluation, where perceived controllability was rated rather low, with the revised design clients and advisors did not feel to be pushed through a standardized process nor did they report to feel restricted by the system's functionality. Even though decisional guidance and system restrictiveness have been suggested to be two distinct sets of system features [Silver 2006], our findings indicate that there may be cases where particular features inadvertently cover both concepts – although the first iteration's process depiction was intended as a means of decisional guidance, users actually perceived it as restrictive. By revising our design from suggestive guidance in the first iteration (proposing a specific advisory process) to more informative guidance in the second iteration (not suggesting any course of activities), we could also address the system's inadvertent appearance of restrictiveness.

Looking at the clients' overall satisfaction with the encounter, the participants of our first evaluation were much less satisfied with the IT-supported situation. A common reason they brought forward was the perceived lack of attention the advisor was paying to them. With the revised design, the artifact still gained much attention but was not perceived as a disturbance any more. We find two explanations to this: (1) the new design enabled the client to better comprehend the advisor's actions, leading to greater client attention on the artifact and reducing attention on the advisor. We can observe similar effects in the traditional setting, where attention and gaze of the actors may also be disrupted by the advisor's artifacts (brochures, fact sheets); however, as long as both actors are jointly focusing on the same artifact, clients do not perceive the advisor's "distraction" as a disturbance. (2) The "sociability" of the client-advisor encounters was greatly improved by introducing the token as an explicit medium of interactional cues, and was also enhanced by providing best practices of how to shift the client's attention.

We also suggest that our second iteration's design choice of providing "public only" information, along with the semi-public use of the advisor's physical notepad, further supported communication and interaction between the actors. For initial small talk or in more comprehensive discussions, the advisor would use his notepad to write down important information in order not to disturb the ongoing dialogue. Whenever the advisor wanted to contextualize this information with the system's visualizations, he would enter the data together with the client. While intuition suggests this redundancy to be annoying for both parties, we found that advisor and client were shifting quite fluently between discussing aspects (and the advisor taking notes) and jointly investigating their effects using the system. These two levels of discussion proved to be a very good compromise to prevent actors from focusing on the system too much.

Our research's *third contribution* pertains to the design process of eliciting and implementing transparency requirements in socio-technical artifacts. Means of effectively fulfilling the requirements were unknown at the very beginning of our research project; indeed, both the specific requirements and their appropriate instantiations emerged as results of our design and evaluation activities. The research process of multiple build-and-evaluate iterations thereby proved to be the sine qua non of discovering effective designs: testing the implemented artifacts allowed us to evaluate their effectiveness against the underlying design goals and to detect shortcomings and design flaws. Iterating this build-and-evaluate process allowed us to incorporate lessons learnt of the first iteration into the second. Thereby, the research process allowed us to refine the artifacts' underlying requirements as well as their instantiation in technology and procedures.

Finally, with these contributions our research also relates to ongoing regulative efforts in financial services. In Europe, for example, the Markets in Financial Instruments Directive (MiFID, [European Commission 2004]) features some general directions of consumer protection in financial services, including minimum requirements of which client information to collect and what relevant information to provide. However, research has frequently pointed to weaknesses and failures of such top-down legal frameworks [Oehler and Kohlert 2009; Jungermann and Belting 2004], arguing that they show little effect on advisory practice because of their generic nature; regulations are found to be neither comprehensive nor specific enough and thereby inappropriately implemented by financial service providers. Our bottom-up approach of transparent IT-support constitutes a promising direction of how to effectively and efficiently implement such requirements of client information; in fact, as our evaluation results show, such an approach might not be a way to enable or increase regulative compliance but also improve advisory encounters for clients and advisors alike.

8. CONCLUSION

In this paper, we presented two design-and-evaluate iterations of IT support for financial advisory encounters, based upon the design principles of establishing transparency and thereby allowing the client to better control and influence the advisory encounter. While the first iteration followed the rationale of "enforced" transparency, the second iteration was based on a more unobtrusive and "casual" instantiation of transparency. By implementing and experimentally evaluating the two designs, we intended to contribute to (1) insights into the role of transparency as a critical element in client-advisor encounter design; (2) design solutions for establishing transparency and their particular instantiations for tabletop systems; and (3) insights into the process of eliciting and fulfilling requirements that are emergent as a result of design activities.

Potential limitations of our research apply to the generalizability of the particular artifact designs. Both the instantiations of the artifacts and their intended usage emerged from multiple design-and-evaluate iterations in the domain of investment advisory services. As such, our design instantiations were customized to support dyadic encounters between clients and financial advisors – thus, the specific designs may not directly fit other domains. Even in related scenarios of asymmetric client-advisor encounters (e.g., insurance advice) the particular differences regarding tasks and actor incentives may outweigh apparent similarities. Thus, while some of the presented primitives of user interface and interaction design may provide helpful starting points for other scenarios of improving transparency in socio-technical systems, the specific requirements and their instantiations are best elicited in dedicated, iterative design-and-evaluate research processes.

To demonstrate the feasibility and utility of our solution approach, we have relied on tabletop technology featuring large displays and multi-touch interaction for multiple users. However, instantiations of the concept could be developed for other technology as well, e.g., for portable hardware like tablet computers. Interesting future work could thereby not only relate to the design of transparency in other domains but also specifically in technological environments that are restricted, e.g., regarding smaller display sizes or single-user interaction.

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